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09/195,125	11/18/1998	MITSUAKI HIRONO	F9600.022/P0	3986

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EXAMINER

ZHEN, LI B

ART UNIT	PAPER NUMBER
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2126

DATE MAILED: 12/15/2003

12

Please find below and/or attached an Office communication concerning this application or proceeding.

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## Office Action Summary

Application No.

09/195,125

Applicant(s)

HIRONO ET AL.

Examiner

Li B. Zhen

Art Unit

2126

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 October 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7,24,25,32 and 33 is/are pending in the application.
- 4a) Of the above claim(s) 2 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-7,24,25,32 and 33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification is objected to under 35 U.S.C. 112, first paragraph, as failing to adequately teach the claimed limitations “disabling context switching between threads when said flag is set to correspond to the absence of context switching” and “enabling context switching between threads when said flag is set to correspond to presence of context switching” as recited in claims 1, 24 and 32.

As to “disabling context switching between threads when said flag is set to correspond to the absence of context switching” and “enabling context switching between threads when said flag is set to correspond to presence of context switching,” applicant discloses throughout the specification that context switch can occur while the flag is set to correspond to the absence of context switching. For example, see p. 18, lines 5 – 16; p. 23, lines 7 – 20; p. 34, lines 4 – 20; p. 35, lines 17 – 25; p. 36, lines 15 – 20; and p. 37, lines 18 – 28; figures 15A, 15B, 19 and 20. The thread makes an API call to request start of detection of presence/absence of a context switching which results in the flag being set to a state corresponding to absence of a context switching (p. 23, lines 10 – 14 of specification). When a context is switched by a scheduler after the flag is set to the state corresponding to the absence of context switch, the flag is set to a state corresponding to the presence of context switching (p. 23, lines 14 – 17 of

specification). A context switch occurs after the flag is set to the state corresponding to the absence of context switch; therefore, the flag in a state corresponding to the absence of context switching does not disable context switch. In addition, the flag in a state corresponding to the presence of context switch does not enable context switch because a context switch can occur when the flag is set to a state corresponding to the absence of context switch. The examiner interprets disable context switch as preventing context switch and enabling context switch as allowing context switch.

However, the flag does not prevent or allow context switch because a context switch occurs even though the flag is set to a state corresponding to the absence of context switch (p. 23, lines 14 – 17 of specification). Therefore, the applicant fails to disclose “disabling context switching between threads when said flag is set to correspond to the absence of context switching” and “enabling context switching between threads when said flag is set to correspond to presence of context switching” in the specification as filed.

2. Claims 1, 3 – 7, 24, and 32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant recites the limitation “disabling context switching between threads when said flag is set to correspond to the absence of context switching” and “enabling context switching between threads when said flag is set to correspond to presence of

context switching” as recited in claim 1, 24 and 32. There does not appear to be a written description of the claimed limitation in the application as filed, for the reasons set forth in the objection to the specification.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 24 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,355,484 to Record and U.S. Patent No. 5,898,873 to Lehr in view of U.S. Patent No. 6,061,711 to Song.

As to claims 1 and 24, Record teaches a program control apparatus for controlling execution of a program in a computer system (computer operating system which manages events; column 2, lines 40 – 45), a predetermined first application program interface call (EventMonitorCreate function 42, Fig. 1) from a thread (event monitor definers 17a-d, Fig. 1) for setting a prescribed flag to one of first and second states (specifying the event monitor parameters; column 6, lines 23 – 40), detecting a prescribed change in a state of the scheduling policy (event signalers 18a,b, and 15a,b detect the occurrence of events and signal the event manager 26, Fig. 1; col. 5, lines 10 – 57), and for setting the flag to the other one of the first and second states (event signal manager signals the event monitor with the event notification and event data; col. 5, lines 10 – 57), and a predetermined second application program interface call from

the thread for returning a value indicative of the state of the flag to the thread (EventMonitorQuery; column 26, lines 46 – 67). Record teaches monitoring events but does specify monitoring context switching events. However, Lehr teaches monitoring the presence/absence of a context switching (logs a context switch [dispatch event]; column 6, lines 5 – 10 and 28 – 45).

It would have been obvious to apply the teaching of monitoring the presence/absence of a context switching as taught by Lehr to the invention of Record because this would provide context switch information to threads interested in the notification of context switches. Record as modified does not teach enabling and disabling context switch. Also, note the 35 U.S.C. 112, first paragraph rejection to claims 1, 24 and 32 above.

However, Song teaches (column 10, lines 21 – 35; column 10, line 55 – column 11, line 5; column 11, lines 40 – 46) disabling context switching (has not requested context switch) when the flag (CSE, context switch enable bit) is set to correspond to the absence of context switching (CSE bit is not set) and enabling context switching (request context switch) when the flag (CSE, context switch enable bit) is set to correspond to presence of context switching (CSE bit is set to one).

It would have been obvious to apply the teaching of enabling and disabling context switch as taught by Song to the invention of Record as modified because this allows context switch to be controlled (column 11, lines 8 – 14 of Song). Obviously, the teaching of Song can be applied at the software level and allow threads to control context switch.

As to claim 3, Record teaches invalidating processing of the thread from the application program interface call requiring start of detection of presence/absence of a context switching until the application program interface call requesting termination of detection of presence/absence of a context switching (it may be important to suspend execution of the other program threads if the event is a system failure which requires an abend; column 9, lines 40 – 46).

As to claim 32, this is a product claim that corresponds to apparatus claim 1; note the rejection for claim 1 above, which also meets this product claim.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Record, Lehr and Song in view of U.S. Patent No. 6,212,544 to Borkenhagen.

As to claim 4, Record as modified does not teach alternately changing priority of a thread to high and low.

However, Borkenhagen teaches (column 19, lines 1 – 20) alternately changing priority of the thread to high and low (thread switch manager alters the actions performed by the hardware thread switch logic to effectively change the relative priority of the threads) based on process time and remaining time (can raise the priority of the thread to influence the response time of the thread to the event).

It would have been obvious to apply the teaching of alternately changing priority of the thread to high and low based on process time and remaining time as taught by Borkenhagen to the invention of Record as modified because this would assure that the threads are processed within the amount of time they are required to.

6. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Record, Lehr and Song in view of U.S. Patent No. 5,088,036 to Ellis.

As to claims 5 and 6, Record as modified does not teach a garbage collection thread and a memory compaction thread.

However, Ellis teaches a garbage collection thread (garbage collector; column 5, lines 50 – 57) that copies an object which is referenced by any other object to a prescribed area in the heap area (garbage collector initially copies only the root objects to new-space; column 5, lines 50 – 57), and a memory compaction thread (collector threads; column 11, lines 52 – 67) that frees a memory area of an object not referenced by any other object in a memory heap area (collector discards the pages, which discards the backing store and physical memory attached to those pages. Backing store and physical memory will be reallocated on demand; column 11, lines 46 – 52).

It would have been obvious to apply the teaching of a garbage collection thread and a memory compaction thread as taught by Ellis to the invention Record as modified because garbage collection would provide efficient memory usage by deallocating unused memory and reusing the memory.

7. Claims 25 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Record in view of U.S. Patent No. 5,842,016 to Toutonghi.

As to claims 25 and 33, these claims are similar to claim 1 with the exception of monitoring the presence/absence of a data write to a designated memory area. Record teaches monitoring events but does specify monitoring the presence/absence of a data write to a designated memory area.



However, Toutonghi teaches (column 2, lines 47 – 67) an application program interface call (DisableGarbageCollection API) which requests start of detection of presence/absence of a data write to a designated memory area (reference-accessing sections), setting a flag indicating presence/absence of a data write to a state corresponding to absence of a data write (DisableGC flag is a flag that may have two states: "set" and "reset." The DisableGC flag is set by the DisableGarbageCollection API, and is reset by the EnableGarbageCollection API; column 7, lines 30 – 67), setting the flag to a state corresponding to presence of a data write when there is a data write to the designated memory area (program that accesses references to objects calls a DisableGarbageCollection API immediately before each group of reference-accessing steps; col. 4, lines 33 – 55), setting the flag to another state when there is no data write to the designated memory area (when a program finishes executing a reference-accessing section, it calls an EnableGarbageCollection API; col. 4, lines 33 – 55), and in response to an application program interface call (EnableGarbageCollection API after reference-accessing section) which requests termination of detection of presence/absence of a data write to the designated memory area, and returning a value corresponding to the state of the flag to the thread (thread 1 exits its current reference-accessing section and calls the EnableGarbageCollection API. The EnableGarbageCollection API returns immediately; column 5, lines 30 – 35). Toutonghi teaches resetting the DisableGC flag after reference-accessing sections. Reference accessing can be either reading a reference or writing a reference. Therefore, Toutonghi teaches setting a flag (reset DisableGC flag) when there is a data write

(reference-accessing is either read access or write access) to the designated memory area (object references).

It would have been obvious to apply the teaching of monitoring the presence/absence of a data write to a designated memory area as taught by Toutonghi to the invention of Record because this would assure access to a designated memory area is synchronized.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Record, Lehr and Song in view of Toutonghi.

As to claim 7, see the rejection to claims 25 and 33 above.

#### ***Response to Arguments***

9. Applicant's arguments filed on August 28, 2003 have been fully considered but they are not persuasive.

Applicant submits, "...the second of the above quoted paragraph clearly indicates that one state of the flag corresponds to the presence of context switching while the other state corresponds to the absence of context switching" and suggests that the rejection under 35 U.S.C. § 112, first paragraph should be withdrawn. The examiner respectfully disagrees because the rejection under 35 U.S.C. § 112, first paragraph suggests that the specification failed to disclose disabling and enabling context switching (see the 35 U.S.C. § 112, first paragraph above). While the passages in the specification cited by the applicant disclose flags with states that correspond to the presence and absence of context switching, it does not disclose or suggest enabling and disabling context switching. It appears the applicant is suggesting that discarding

the process space of a thread/process and rescheduling the thread/process for execution after receiving an indication a context switch occurred is equivalent to disabling and enabling context switching (p. 11, lines 15 – 20). The examiner respectfully disagrees because the step of discarding the process space and rescheduling the thread/process for execution is done after a context switch has occurred; therefore, context switching is not disabled. The examiner interprets disable context switch as preventing context switch from occurring and enabling context switch as allowing context switch to occur. However, the flag as disclosed in the specification does not prevent or allow context switching. Instead, context switching occurs even though the flag is set to a state corresponding to the absence of context switch and the process space of the thread/process is discarded and the thread/process is rescheduled for execution if the flag indicated a context switch occurred during the time between two API calls (p. 11, lines 15 – 20).

Applicant argues, "Toutonghi does not disclose or suggest 'setting said flag to a state corresponding to presence of a data write when there is a data write to the designated memory area'" (p. 14, line 25 – p. 15, line 1). The examiner respectfully disagrees because Toutonghi teaches (column 2, lines 47 – 67; column 7, lines 30 – 67) setting a flag to a state corresponding to presence of a data write (EnableGC event is set when the thread calls the EnableGarbageCollection API) when there is a data write (EnableGarbageCollection API after reference-accessing sections) to the designated memory area (object references). Toutonghi teaches resetting the DisableGC flag after reference-accessing sections. Reference accessing can be either reading a reference

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or writing a reference. Therefore, Toutonghi teaches setting a flag (reset DisableGC flag) when there is a data write (reference-accessing is either read access or write access) to the designated memory area (object references).

**Conclusion**

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


U.S. Patent No. 6,026,428 to Hutchison teaches a thread context manager and methods for creating and suspending context on a thread for a target object.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li B. Zhen whose telephone number is (703) 305-3406. The examiner can normally be reached on Mon - Fri, 8am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John A. Follansbee can be reached on (703) 305-8498. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

lbz  
December 9, 2003

 Li B. Zhen  
Examiner  
Art Unit 2126  
**JOHN FOLLANSBEE**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2100**